WHAT IS CLAIMED IS:

1. A method of measuring on-chip fluid flow within a microfabricated device comprising:

introducing a heat tracer into a fluid flowing within a passageway of said microfabricated device, including defining a start region for determining a propagation rate of said heat tracer within said passageway;

monitoring a condition of said fluid during passage through an interrogation region;

based on said monitoring, detecting when said heat tracer reaches said interrogation region, thereby acquiring information relevant to said propagation rate of said heat tracer from said start region to said interrogation region; and

determining a bulk flow rate of said fluid through said passageway on a basis of said detecting and on a basis of an adjustment that is specific to a scaling between said bulk flow rate and said propagation rate of said heat tracer.

2. The method of claim 1 further comprising calculating said adjustment using parameters specific to properties of said fluid and properties of structure of said microfabricated device directly related to forming said passageway.

3. The method of claim 2 wherein using said properties includes employing values for

(a) heat capacities of said fluid and said structure directly related to forming said passageway;

(b) geometries of said passageway and said structure;

(c) density of said fluid; and

(d) materials which define walls of said passageway.

4. The method of claim 3 wherein employing said values includes

(a) determining a ratio of said heat capacity of said structure to a heat capacity of said fluid; and

(b) determining a ratio of a cross sectional dimension of said passageway to a cross sectional dimension of said structure.

5. The method of claim 1 wherein said determining said bulk flow rate includes calculating said propagation rate of said heat tracer and applying an algorithm which is specific to compensating for said scaling between said propagation rate and said bulk flow rate.

6. The method of claim 1 wherein said determining said bulk flow rate includes calculating said propagation rate of said heat tracer and applying a calibration curve which implements an upward adjustment of said propagation rate.

7. The method of claim 1 wherein said introducing said heat tracer includes selectively activating on-chip circuitry of said microfabricated device.

8. The method of claim 1 wherein said monitoring includes providing on-chip determinations of one of electrical and optical properties of said fluid, where said properties vary with variations in temperature of said fluid.

9. The method of claim 8 wherein said monitoring further includes utilizing on-chip processing circuitry in detecting changes in said properties.

10. A system for monitoring flow comprising:

a substrate having integrated microfluidic features, including a microfluidic channel having an entrance coupled to receive a flow of fluid;

a heat generator coupled to introduce heat tracers into said flow of fluid;

a detector positioned to detect temperature-dependent variations in said fluid along said microfluidic channel, said detector having an output indicative of said temperature-dependent variations; and

a processor connected to said detector to receive said output, said processor being configured to determine tracer propagation transit times of said heat tracers through said microfluidic passageway and to determine bulk fluid flow rates through said microfluidic passageway, said tracer propagation transit times being based on data that includes said output of said detector, said bulk fluid flow rates being based on said tracer propagation transit times and a pre-identified scaling between tracer propagation rates of said microfluidic passageway and said bulk fluid flow rates of said microfluidic passageway.

11. The system of claim 10 wherein said heat generator and said detector are integrated onto said substrate, said heater generator and said detector being microfabricated components.

12. The system of claim 10 wherein said processor is coupled to a storage of information specific to said scaling between said tracer flow and bulk fluid propagation rates of said microfluidic passageway.

13. The system of claim 12 wherein said information includes a calibration curve that is representative of said scaling for various said tracer propagation rates.

14. The system of claim 12 wherein said information includes property data indicative of known properties and geometries of said microfluidic passageway and said fluid, said processor being configured to execute an algorithm that uses said property data to determine said bulk fluid flow rate.

15. The system of claim 14 wherein said processor is integrated onto said substrate.

16. A method of measuring on-chip fluid flow comprising:

providing a microfabricated system having microfluidic features integrated with electronic circuitry onto a substrate, said microfluidic features including a microfluidic passageway having an interrogation region;

storing passageway data indicative of passageway-related factors relevant to determining a difference between a speed of fluid through said microfluidic passageway and a propagation speed of a heat pulse of fluid through said microfluidic passageway;

storing fluid data indicative of fluid-related factors relevant to determining said difference;

inducing a flow of fluid through said microfluidic passageway;

introducing a heat pulse into said flow;

determining a propagation speed of said heat pulse within said microfluidic passageway; and

converting said propagation speed of said heat pulse to a speed of said flow by using said passageway data and said fluid data.

17. The method of claim 16 wherein said storing passageway data includes determining information specific to the dimensions and materials of structure that forms said microfluidic passageway.

18. The method of claim 17 wherein said storing fluid data includes determining a heat capacity of said fluid.

19. The method of claim 16 wherein providing said microfabricated system includes integrating a heat generator and a heat pulse detector onto said substrate.

20. The method of claim 19 wherein integrating said heat generator includes embedding at least one thin film resistor into said substrate.

21. The method of claim 16 wherein introducing said heat pulse includes providing direct electrical heating of said fluid.

22. The method of claim 16 wherein introducing said heat pulse includes providing optical heating of said fluid.

23. The method of claim 16 wherein determining said propagation speed of said heat pulse includes monitoring conductivity of said fluid flowing through an interrogation region downstream of a start region at which said heat pulse is introduced.

24. The method of claim 16 wherein determining said propagation speed includes embedding a series of sensing features on said substrate and utilizing at least one said sensing feature to monitor properties of said fluid within an associated interrogation region of said microfluidic passageway, thereby providing a plurality of said interrogation regions.